

UNITED STATES PATENT OFFICE

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SURGICAL BANDAGE AND METHOD OF PREPARING SAME

No Drawing.

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This invention relates to plaster of Paris bandages and particularly to an improved method of incorporating in the bandage an agent for regulating or predetermining the setting time of the plaster.

Bandages of this type may be made by either the wet or the dry process. In the wet process the powdered plaster is compounded with a solution of a suitable adhesive material until it is reduced to the consistency of a thick cream or paste, after which it is spread upon the foundation fabric, which is then dried and cut into the desired lengths and finally rolled into bandage form. In the dry process, which is the one more commonly used, the fabric is first cut into strips of the desired width and the plaster in the dry condition is spread on the strips in the desired quantity. The strips with the dry powder incorporated therein are then rolled into bandage form. The rolled bandages, whether made by the wet or by the dry process, are made ready for casting by immersing them in water until the plaster has been thoroughly moistened, whereupon they may be applied to the member upon which the cast is to be formed.

The present practice, in the case of accelerated plasters, is to regulate the setting time of the bandage by incorporating in the plaster, preliminary to its application to the bandage fabric, a certain amount of an agent which is adapted to accelerate the hardening of the plaster, the amount depending upon the setting time desired. Potassium sulphate is an example of one of the more commonly used accelerating agents. One of the great difficulties encountered in the use of an accelerating agent under the present practice, is due to the fact that the relative proportion of the agent required, as compared to the quantity of plaster, is very small. For the ordinary range of setting times the quantity of accelerating agent required represents but a fraction of a per cent. of the weight of the mixture. However, in order to obtain uniformity it is very important that the small quantity of the accelerator be thoroughly mixed with the larger body of plaster. That this mixing operation is costly is evi-

denced by the fact that the price of an accelerated plaster, that is, a plaster into which there has been incorporated an agent for accelerating the hardening, is approximately twice the price of a plaster which has not been mixed with such an agent.

It may be noted at this point, that an ordinary untreated plaster, that is, a plaster which has not been mixed with an accelerating agent, will contain small amounts of various substances which act more or less as accelerators, as for example, the sulphates, chlorides, and carbonates of certain of the more common metals. These substances are present simply for the reason that they cannot be eliminated in the ordinary course of manufacture of the plaster. In using the term "unaccelerated plaster" I refer to a plaster in which no accelerating agent has been incorporated by artificial mixing. Even in such a plaster there would in all probability be present certain amounts of the accelerating substances above referred to.

I have found that in the case of surgical bandages greater uniformity of results may be obtained, as compared to the present practice, by applying an unaccelerated plaster to a foundation fabric into which there has been preliminarily incorporated measured amounts of an accelerating agent. My experiments have shown that with the improved practice the predicted setting time may be much more closely approximated than is possible under the old practice, and also that the accelerating agent may be more uniformly distributed over each unit area of the fabric than it can be under the present procedure where an accelerated plaster is applied to an untreated fabric. In addition, the invention eliminates the need of using an accelerated plaster, the cost of which represents a very substantial part of the cost of the bandage.

In practising the invention a typical mode of procedure would be as follows:

A sizing bath is first prepared by dissolving 3.6 pounds potassium sulphate in 100 pounds of water and mixing with this solution 7.7 pounds cornstarch, the mixture being then brought to a boil. A crinoline is then prepared by passing a 32—28 mesh gauze

through the sizing bath and then drying by any approved method. The desired amount of unaccelerated plaster is then spread or otherwise applied to the crinoline, after which
5 the impregnated strip may be rolled into bandage form. Moistening the bandage preparatory to making the cast, serves to bring the entire body of the plaster into intimate contact with the accelerating agent which is
10 distributed through the body of the crinoline, so that quick setting is readily attained. My experiments have shown that with a bandage prepared in the manner described, and having a plaster density of .22 grams per
15 square inch of crinoline, the setting will occur in 18 minutes. By placing a like quantity of unaccelerated plaster on a crinoline which contained no accelerating agent, it was found that the setting time was about 40 minutes.
20 This clearly demonstrates the effectiveness of the accelerator when introduced in the bandage in this manner.

If it is desired to use a gauze instead of a crinolin for the bandage, the procedure would
25 be the same as above outlined, with the exception that instead of using a sizing bath of the above composition, the bath would consist merely of water and potassium sulphate, the starch being omitted. A bandage prepared from a gauze thus treated has been
30 found to have the same setting time as a similar bandage prepared from crinoline and containing corresponding densities of plaster.

Powdered gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) may be
35 used as an accelerator in place of potassium sulphate. It may be applied to the gauze by introducing it into the sizing bath in the form of a fine suspension which, when dried, will adhere to the fabric. The gypsum may
40 be used where the bandage is made of gauze as well as in the case where it is made from crinoline, the only difference being that no sizing agent is introduced into the bath when using gauze. Among other substances which
45 serve as accelerators may be mentioned alum, sodium silicate, magnesium sulphate, sodium chloride, and calcium chloride.

The practice of the invention not only gives greater uniformity in the distribution of the
50 accelerating agent through the body of the bandage than is possible by the old method, but also considerably lowers the cost of manufacture. The marked saving effected by eliminating the need of using an accelerated plaster has already been referred to. Another
55 very important saving in the cost of manufacture is made possible by reason of the ease with which the equipment may be changed from making a bandage having one setting
60 time to the making of a bandage having another setting time. Under the present practice in making the change from one plaster to another having a different setting time, with a corresponding different percentage of
65 accelerator, it is necessary to thoroughly re-

move from the machines the plaster used in the previous run before introducing the second kind of plaster. The reason for this is obvious, since the contamination of one plaster with another having a different setting
70 time would render the resultant product uncertain as to setting time. In the practice of my invention, to change from one run to another it is merely necessary to change from one crinoline or gauze, which has been treated
75 with an accelerator to give a certain setting time, to another crinoline or gauze which has been so treated as to have the setting time desired for the second run.

The invention is to be considered as adaptable broadly to the incorporation in the foundation fabric of any agent for regulating the
80 setting time of the plaster. While I have referred in the above example to the practice as applied to an accelerating agent, it is equally well adapted to the case where it is desired
85 to incorporate a retarding agent in the fabric. For example, it may be desired to make a bandage which would require a considerably longer time to set than would be required by
90 an untreated plaster, that is, a plaster which has not been mixed with an agent for regulating the setting time.

The practice as applied to a retarding agent would be substantially the same as that described in connection with an accelerating
95 agent. For the potassium sulphate, or other accelerating agent, there would of course be substituted the required amount of a retarding agent. There are several retardants that
100 may be used. Examples of the preferred retardants are: protein colloids, such as glue, blood, and the like. Among other suitable retardants may be mentioned sodium acetate, boric acid, sodium borate, magnesium oxide,
105 and various ammonium salts including phosphates, hypophosphates, carbonates, and acetates.

The foregoing detailed description has been given for clearness of understanding only,
110 and no unnecessary limitations should be understood therefrom, but the appended claims should be construed as broadly as permissible in view of the prior art.

What I regard as new and desire to secure by Letters Patent is:

1. In the preparation of a plaster of Paris bandage the step which comprises treating a foundation fabric before the application of
120 plaster thereto, to incorporate in the fabric an agent for regulating the setting time of the plaster.

2. In the preparation of a plaster of Paris bandage the steps which comprise preliminarily incorporating in a foundation fabric
125 an agent for accelerating the hardening of the plaster, and thereafter applying a thin layer of an unaccelerated plaster to the fabric.

3. In the preparation of a plaster of Paris

bandage the steps which comprise preliminarily incorporating in a foundation fabric an agent for regulating the setting time of the plaster, and thereafter applying to the fabric the desired amount of a plaster which is substantially free of agents adapted to regulate the setting time thereof.

4. In the preparation of a plaster of Paris bandage the steps which comprise treating a foundation fabric with a solution containing an agent for regulating the setting of the plaster, drying the fabric, and finally applying to the fabric a thin layer of a plaster which is substantially free of agents adapted to regulate the setting time thereof.

5. In the preparation of a plaster of Paris bandage the steps which comprise immersing a fabric foundation in a sizing solution containing an agent for regulating the setting time of the plaster, drying the fabric foundation, and finally applying to the dried fabric foundation a thin layer of plaster which is substantially free of agents adapted to regulate the setting time thereof.

6. The method of preparing a plaster of Paris bandage which comprises treating a foundation fabric with a solution containing an agent for accelerating the hardening of the plaster, drying the fabric, and finally applying to the fabric the desired amount of an unaccelerated plaster.

7. The method of preparing a plaster of Paris bandage which comprises treating a foundation fabric with a solution containing an accelerating agent in an amount determined by the setting time desired, drying the fabric, and finally applying to the fabric the desired amount of an unaccelerated plaster.

8. The method of preparing a plaster of Paris bandage which comprises treating a foundation fabric with a solution containing an accelerating agent comprising potassium sulphate, drying the fabric, and finally applying to the fabric the desired amount of an unaccelerated plaster.

9. The method of preparing a plaster of Paris bandage which comprises treating a foundation fabric with a solution containing an accelerating agent comprising powdered gypsum, drying the fabric, and finally applying to the fabric the desired amount of an unaccelerated plaster.

10. The method of preparing a plaster of Paris bandage which comprises treating an open mesh fabric with a solution containing an agent for regulating the setting time of the plaster, drying the fabric, and finally applying to the fabric a layer of plaster which is substantially free of agents adapted to regulate the setting time thereof.

11. As an article of manufacture a plaster of Paris bandage comprising a foundation fabric having incorporated therein an agent for accelerating the setting time of the plaster, and a quantity of unaccelerated plaster

of Paris distributed in a thin layer over the body of the fabric.

12. As an article of manufacture a plaster of Paris bandage comprising a fabric strip into which there has been incorporated an agent for regulating the setting time of the plaster, and a layer of plaster of Paris supported on said fabric, said plaster being substantially free of agents adapted to regulate the setting time thereof.

13. The method of preparing a plaster of Paris bandage which comprises treating a foundation fabric with a solution containing a retarding agent comprising a protein colloid, drying the fabric, and finally applying to the fabric the desired amount of a plaster which is substantially free of agents adapted to retard the setting time thereof.

14. As an article of manufacture a foundation fabric for plaster of Paris bandages, said fabric having incorporated therein an agent for accelerating the setting time of the plaster upon subsequent application of the latter to the treated fabric.

In witness whereof, I hereunto subscribe my name to this specification.

RAYMOND E. REED.